

*Results.*

	WO <sub>3</sub>	H <sub>2</sub> O	AT. MASS W.
	0.983024	—0.22834	—184.683
	0.998424	—0.23189	—184.709
	1.008074	—0.23409	—184.749
	0.911974	—0.21184	—184.678
	0.997974	—0.23179	—184.704
	1.007024	—0.23389	—184.706
	Mean.....		<u>184.704</u>
Maximum.....			184.749
Minimum.....			<u>184.678</u>
Diff.....			.071

The mean 184.704 falls below that given by Pennington and Smith. The discrepancy may possibly be due to the method, or the personal factor entering into the work may account for it. However, the result we believe clearly proves that the atomic mass of tungsten is certainly greater than what is generally assumed as correct, and in all likelihood the molybdenum contained in the tungsten has caused the low values found by previous experimenters.\*

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*Notices of Presumably Undescribed Infusoria.*

*By Dr. Alfred C. Stokes.*

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*Salpingæca globosa*, sp. nov. (Fig. 1).—Lorica pedicellate, carafe-shaped, the body subspherical, tapering at the posterior extremity to the pedicle; neck conspicuous, about one third as long as the body of the lorica, the margin flaring; pedicle often oblique, somewhat flexuous, and about as long as the entire lorica. Solitary. Length,  $\frac{1}{2250}$  inch. *Hab.*—Fresh water, near Trenton, N. J.; attached to filamentous algæ.

*Salpingæca collaris*, sp. nov. (Fig. 2).—Lorica vasiform, less than four times as long as broad, but divisible by its characteristic contour

\* A review of all the methods heretofore used in determining the atomic mass of tungsten has been begun by one of my assistants. Care is being taken to completely eliminate certain sources of error which have not been absolutely excluded in earlier work.—E. F. S.

into two regions, a posterior, inflated, obovate portion, tapering to the pedicle, and an anterior region, subcylindrical, somewhat exceeding the posterior region in length, its lateral margins parallel, the anterior aperture circular, its borders everted; pedicle usually exceeding the lorica in length; enclosed animalcule freely motile within the lorica, at times situated exclusively within the frontal, neck-like portion, at others extending into the anterior region of the posterior part of the sheath; when disturbed retreating into the posterior region, and advancing to the frontal portion when its fright has passed, the sarcode then completely filling that part of the lorica and taking its shape. Length of lorica  $\frac{1}{1200}$  inch. *Hab.*—Standing water from the Morris and Essex canal, New Jersey.

The water in which this beautiful and characteristic form was found was taken from the canal late in the autumn of 1891, by Mr. S. Helm, of New York city, and by him sent to me. It remained on my table until February 17, 1892, almost unnoticed, except that a little water was occasionally added to supply that lost by evaporation. On the date last mentioned the animalcule was found in some abundance, attached to various submerged fragments and in company with a profusion of *Salpingoeca gracilis* J. Clk., a form which it somewhat resembles, and near to which it should be classified.

*Prorocentrum humatum*, sp. nov. (Fig. 3).—Body ovate, less than twice as long as broad, smooth, depressed, the lateral borders slightly flattened, the posterior margin evenly rounded and obtusely pointed; dorsal surface convex; ventral aspect somewhat flattened, bearing on its frontal margin a stout, anteriorly projecting, obtusely pointed, often colorless process, which is bent hook-like almost at a right angle, directed towards the left-hand side and slightly excavated dorsally, thus exhibiting a ledge-like or shelf-like projection towards that aspect of the body; frontal border truncate, surrounded, within the margin, by an annular groove, the right-hand and left-hand ventral continuations of which extend obliquely along the adherent posterior prolongation of the frontal process and unite to form a subcentral, longitudinal ventral depression; anterior flagellum spirally undulating, taking its origin from within the ventral portion of the anterior groove, on the left-hand side of the posterior prolongation of the hook-like process, and extending round the frontal border into the groove on the right-hand side of the frontal projection; ventral flagellum long, trailing, vibratile, taking its origin from near the central region of the ventral groove; nucleus subspherical, located near the posterior extremity, often with an apparently amyaceous corpuscle on one side and near it. Chromatophores linear, elongate, vermicular or variously curved. Length,  $\frac{1}{900}$  inch. *Hab.*—Brackish water from a salt marsh on Coney Island, N. Y. Movements rotary on the longitudinal axis. Abundant.

This form was collected and sent to me by Mr. H. C. Wells, of Short Hills, N. J.

Although *Trachelomonas* is probably not an infusorian, the following descriptions are here included for convenience.

*Trachelomonas fusiformis*, sp. nov. (Fig. 4).—Lorica fusiform, three times as long as broad, punctate with minute, scattered, conical elevations which are larger and more conspicuous near the margin of the posterior prolongation; anterior region narrowed, neck-like, the frontal border slightly everted, the margin minutely denticulate; color brown. Length of lorica,  $\frac{1}{375}$  inch. *Hab.*—Pond water, near Trenton, N. J.; movements tremulous and rotary on the longitudinal axis.

*Trachelomonas spherica*, sp. nov. (Fig. 5).—Lorica subspherical, somewhat depressed, the anterior aperture produced into a short, cylindrical, neck-like region, its frontal margin with four or more obtuse denticulations; entire surface of the lorica armed by long, conspicuous, obtuse spinous processes, the largest of which are subequal in length to the length of the neck-like portion of the sheath; color reddish brown; flagellum in length equaling or exceeding the circumference of the lorica. Diameter, including the length of the spinous processes,  $\frac{1}{560}$  inch. *Hab.*—Pond water, with *Lemna*, near Trenton, N. J. Movements rapidly rotary.

*Trachelomonas acanthophora*, sp. nov. (Fig. 6).—Lorica fusiform, about twice as long as broad, the posterior region somewhat suddenly contracted into a short, naked, punctate or smooth, prolongation, terminated by three diverging spines; anterior region produced as a neck-like portion, naked and punctate or smooth, the anterior border truncate, the margin bearing four or more radiating spines; central or body-region armed by numerous, conical, spine-like prolongations; flagellum equaling or exceeding the lorica in length; endoplasm green. Length of lorica, including spines,  $\frac{1}{560}$  inch; width, without spines, about  $\frac{1}{1200}$  inch. *Hab.*—Pond water, with *Lemna*, near Trenton, N. J. Movements rotary on the longitudinal axis.

*Vaginicola longipes*, sp. nov. (Figs. 7, 8).—Lorica trumpet-shaped, much compressed, rather more than four times as long as broad, widest and inflated near the middle third, thence tapering posteriorly to a narrow, irregularly subcylindrical region forming from one-third to one-half of the entire length of the lorica; anterior border slightly everted, the lateral margin somewhat constricted beneath the frontal region; lorica often irregularly constricted, the posterior, pedicle-like portion frequently curved, and variously contorted, bent or irregularly inflated, the whole becoming chestnut-brown with age; enclosed animalcule adherent posteriorly to a long, narrow pedicle apparently attached to the posterior extremity of the lorica, but often there becoming indistinct, and at times seemingly adherent to one lateral margin; body soft and flexible, finely striate transversely, extending slowly and irregularly, often undulate or vermicular in form, the contracted anterior region bending posteriorly, the flexure thus produced advancing towards the anterior aperture of the lorica, the unexpanded peristomal region apparently wedged against the lateral borders of the sheath, the animalcule thus remaining until another

contraction changes its position; extended body elongate, very narrow, projecting for from one-third to one-half its length, or more, beyond the frontal aperture; peristome broad, somewhat oblique; contracted body obovate; nucleus elongate, narrow, band-like, exceedingly tortuous during the contracted state of the animalcule; contractile vesicle single, spherical, anteriorly situated. Length of lorica, about  $\frac{1}{80}$  inch. *Hab.*—Attached to aquatic plants from Rancocas creek, at New Lisbon, N. J.

*Caulicola (caulis, stem; colo, to inhabit), gen. nov.*—Animalcules loricate, as in *Thuricola*, except that the lorica is conspicuously pedicellate, and possesses a valve-like appendage which is not attached to the wall within the lorica, as in *Thuricola*, but to the lateral margin of the anterior aperture.

*Caulicola valvata*, sp. nov. (Fig. 9).—Lorica ovate, less than twice as long as wide, posterior border rounded, somewhat inflated, thickened centrally and with a short, posterior projection at its point of attachment to the pedicle; lateral walls often slightly undulate, and usually narrowed at the truncate, anterior aperture; valve-like appendage attached to the lateral border of the anterior aperture, rising by the pressure of the extending animalcule, and when fallen, completely closing the orifice by a horizontal, flat-topped lid; pedicle slender, thickened centrally, and with a short anterior projection at its point of attachment to the lorica, tapering posteriorly, and about one-third as long as the lorica; body of enclosed animalcule colorless, transparent, and when extended, protruding about one fourth of its length beyond the lorica; cuticular surface transversely striate; nucleus elongate, band-like. Length of lorica,  $\frac{1}{500}$  inch. *Hab.*—Brackish water from Coney Island, N. Y. Collected and sent to me by Mr. H. C. Wells, of Short Hills, N. J.

*Bicosæca phiula*, sp. nov. (Fig. 10).—Lorica elongate-vasiform, less than twice as long as broad, widest anteriorly, tapering posteriorly to the pedicle; anterior margin everted, truncate; lateral borders often almost rectilinear; pedicle short; enclosed animalcule not exerted; contractile vesicles two or more, often four, near the posterior extremity; nucleus not observed. Length of lorica,  $\frac{1}{1285}$  inch. *Hab.*—Pond water from near Trenton, N. J.; attached to filamentous objects.

*Enchelyodon vesiculosus*, sp. nov.—Body elongate-ovate, one lateral border somewhat concave, the other convex; both extremities rounded, the anterior somewhat truncate; soft, flexible and changeable in shape; about twice as long as broad, the cuticular surface longitudinally striate, entirely ciliate; pharynx obconical, about one-third as long as the body, longitudinally plicate, the anterior orifice transversely oval; nucleus apparently subspherical or broadly oval, subcentrally located; contractile vesicles three or more, near the posterior extremity; anal aperture postero-terminal; endoplasm enclosing numerous, green corpuscles which obscure the internal structure, and render the body semi-opaque. Movements rotary on the longitudinal axis. Length of body,  $\frac{1}{100}$  inch. *Hab.*—Pond water in early spring, from near Trenton, N. J.

This form differs from *E. farctus* C. & L., in the presence of the multiple contractile vesicles and in the single, rounded nucleus, the latter in *E. farctus* being recorded as band-shaped.

The infusorian was obtained in abundance in a gathering made in the middle of February in the mild winter of 1889-'90. Reproduction is by transverse fission.

*Nassula trichocystis*, sp. nov. (Fig. 11).—Body elongate-ovate or subelliptical, cylindrical, more than twice as long as broad, the two extremities subequal; oral aperture near the anterior extremity, in a slight depression or concavity of the lateral body-margin, and followed by a conspicuous, conical, pharyngeal rod-fascicle extending to near the body-centre; oral cilia somewhat larger and more conspicuous than those of the general surface; contractile vesicle single, spherical, laterally placed in the posterior part of the anterior body-half, often leaving small lacunæ at complete systole; nucleus subspherical, subcentrally located; trichocysts exceedingly abundant, obliquely and densely set within the cortical layer; endoplasm frequently exhibiting a movement of rotation. Length,  $\frac{1}{375}$  inch. *Hab.*—Pond water, near Short Hills, N. J. Movements rotary on the longitudinal axis.

This form, which is interesting on account of the remarkable abundance of trichocysts enclosed by the cortex, was collected by Mr. H. C. Wells, of Short Hills, N. J., and by him sent to me.

*Urostyla vernalis*, sp. nov. (Fig. 12).—Body elongate-ovate, or subelliptical, soft and flexible, about three times as long as broad, both extremities rounded, the anterior somewhat curved towards the left-hand side and slightly narrowed; posterior extremity sometimes evenly convex, frequently obtusely pointed on the right-hand side of the median line; dorsal aspect convex, its cuticular surface irregularly roughened by clusters of minute, rounded elevations arranged in irregularly longitudinal series; lateral body-margins of the larger infusorians often flattened and subparallel, those of the smaller forms convex; upper lip crescentic; peristome field obovate, the anterior region of the adoral depression proper not including any portion of the frontal border, but taking its origin posteriorly to that margin, at a distance about equal to one-tenth the length of the entire body, and extending on the left-hand side of the body somewhat obliquely backward towards the right-hand side for about one-third the length of the ventral surface, its left-hand margin bearing a series of large and conspicuous adoral cilia, and a row of finer par-oral cilia, the right-hand border supporting an undulating membrane and a series of fine pre-oral cilia; endoral cilia none; uncinat frontal styles from four to six, distally bifid and somewhat irregularly placed near the right-hand border of the peristome field; ventral surface clothed by fine, vibratile cilia in six parallel, longitudinal lines; marginal setæ longest, largest and most conspicuous on the posterior border, where they are slightly interrupted, those on the two sides of the median line of the body usually directed towards one another and frequently overlapping; anal styles slender,

fimbriated, from six to eight in number, arranged in an oblique row and not projecting beyond the body-margin; contractile vesicle single, spherical, near the left-hand side of the anterior body-half, in the dorsal aspect, the cuticular surface of which it elevates at its systole, and through which it seems to discharge its contents; nucleus double, the two nodules ovate, one being in the anterior, the other in the posterior body-half, near the left-hand body-margin, and each bearing a laterally attached nucleolus; anal aperture not observed. Length from  $\frac{1}{100}$  to  $\frac{1}{75}$  inch. *Hab.*—Shallow way-side pools in the early spring, near Trenton, N. J. Reproduction by transverse fission. Endoplasm brown.

This form bears a somewhat close resemblance to *Urostyla trichogaster* Stokes, but differs conspicuously in its habitat, *U. trichogaster* being found in infusions of decaying vegetable matters, the present species in the clear, pure waters of the pools of early spring. It also differs in the character of the adoral depression which does not include a part of the frontal border of the body; in the absence of the endoral cilia, and especially in the fewer frontal styles.

The body is exceedingly soft and flexible, and its motions active. The brown endoplasm is often of a beautiful, transparent golden tint. The favorite food is the algal spores and the other small vegetal objects with which the shallow pools are at this time of the year so well supplied, while the food of *U. trichogaster* is chiefly animal.

*Acineta corrugata*, sp. nov. (Figs. 13, 14, 15).—Lorica ovate or sub-triangular, compressed, the length but slightly exceeding the greatest breadth; lateral margins convex, tapering towards the pedicle and variously crenated, or almost smooth and even; general surface bearing numerous, irregularly disposed but frequently parallel and centrally converging, linear ridges, that vary in number, arrangement and general direction with the age of the lorica, in maturity and in old age the inter-linear spaces becoming exceedingly prominent as inflated, rounded and elongated prominences, the lateral borders of the lorica then being conspicuously and irregularly crenate; anterior margin slightly elevated centrally, this elevation extending perpendicularly along the subcentral region of the frontal and of the dorsal aspects of the sheath, this in transverse, subcentral optical section having a rhomboidal outline, the lateral borders truncate and emarginate; anterior border of the lorica closed in except for a narrow, slit-like aperture traversing it, and an ovate orifice at each antero-lateral margin for the passage of the fasciculate, capitate tentacles; frontal region, in surface view, compressed and undulate, or with six oppositely disposed, concave depressions; pedicle conspicuous, well-developed, hollow and about one-third as long as the lorica; nucleus apparently broadly ovate and subcentrally located; endoplasm coarsely granular; the enclosed animalcule usually nearly filling the cavity of the sheath. Length, including pedicle,  $\frac{1}{450}$  inch. *Hab.*—Attached to filamentous algae in the brackish water of a salt marsh, Coney Island, N. Y.

The corneous, transparent lorica is exceedingly thin and delicate, vary-



ing much in connection with the surface plications or ridge-like elevations, in early youth the raised lines being low, inconspicuous and irregularly disposed; in maturity becoming full, rounded and prominent, separated by deep furrows, as if the wall of the lorica had become distended with liquid, dilatation taking place at expansile regions between the ridge-like markings of the earlier stage; in the mature state the lateral borders are protuberantly crenate.

*Acineta flexilis*, sp. nov. (Fig. 16).—Lorica irregularly subspherical, tapering posteriorly to the short, hollow pedicle; anterior border closed, thin, apparently perpendicularly lamelliform, the margin irregularly undulate; two opposite lateral regions each bearing two anteriorly approximating, posteriorly diverging, narrow fissures for the passage of the tentacles, the fissures usually being open only sufficiently for the passage of the tentacles, except during the final development and the escape of the embryo, when those on the lateral margins and that on the frontal border are seen to be continuous, the expanding fissures closing after the escape of the embryo; pedicle about one-seventh as long as the lorica; tentacles capitate, of two kinds and apparently issuing only from the slit-like lateral fissures, one kind being straight, rigid, and not often exceeding twice the length of the lorica, the other form filamentous, flexible, writhing and variously curved and coiled, often extending to more than five times the length of the lorica; body of the animalcule subspherical or obpyriform, not filling the cavity of the lorica, and in no way adherent to it; endoplasm granular; nucleus broadly ovate, located near one lateral border; contractile vesicle single, spherical, postero-lateral in the region opposite the nucleus. Length of the lorica, including the pedicle,  $\frac{1}{30}$  inch. *Hab.*—Fresh water from near Trenton, N. J.; attached to *Spirogyra*.

*Codosiga florea* Stokes (*Journ. Trenton Nat. Hist. Soc.*, January, 1888, Vol. i, No. 3).—This was incorrectly placed in the genus *Codosiga*; it is a *Monosiga*, and should be referred to as *Monosiga florea*.

*Halsia furcata* Stokes (*Journ. Royal Micros. Soc.*, August, 1889).—This generic name being preoccupied, it may, in this instance, be changed to *Halsiopsis*, the single known species then being *Halsiopsis furcata*.

#### EXPLANATION OF THE PLATE.

- Fig. 1. *Salpingœca globosa*; with collar retracted.  
 “ 2. *Salpingœca collaris*.  
 “ 3. *Prorocentrum hamatum*.  $\times 720$ .  
 “ 4. *Trachelomonas fusiformis*.  $\times 500$ .  
 “ 5. *Trachelomonas sphaerica*.  $\times 460$ .  
 “ 6. *Trachelomonas acanthophora*.  $\times 500$ .  
 “ 7, 8. *Vaginicola longipes*.  $\times 200$ .  
 “ 9. *Caulicola valvata*.  $\times 400$ .  
 “ 10. *Bicosœca phiala*; empty lorica.  $\times 835$ .

